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Claims (as filed on January 23, 2004 - Art. 19)

1. A capsule

- having a diameter of less than 100 µm, and
- an envelope which comprises at least three polyelectrolyte layers and a layer of a sensitive material which is covalently linked to a dye,

with the concentration of the dye being so high that the dye forms dimers, aggregates or excimers with itself, which latter leads to self-quenching of the fluorescence or to the formation of a new emission band.

2. A capsule as claimed in claim 1, characterized in that the sensitive material is a material which either swells or shrinks, with its volume thereby being altered, when its environmental conditions change.

3. A capsule as claimed in claim 2, characterized in that the environmental conditions are the pH, the salt concentration, the temperature, adsorbed components, enzymes, the concentration of a substance, physical parameters, components which affect the solvent or which react with the sensitive material, and also miscible solvent constituents.

4. A capsule as claimed in one of claims 1 to 3, characterized in that the concentration of the dye satisfies the relationship mass of sensitive material:mass of dye < 500:1.

5. A capsule as claimed in one of claims 1 to 4, characterized in that the polyelectrolyte layer which is labeled with dyes is an organic polyelectrolyte layer which is labeled with dyes.

6. A composition for identifying or labeling substances, with the composition comprising at least

two types of different capsules and the capsules

- having a diameter of less than 100 µm and
- an envelope which comprises at least three polyelectrolyte layers, with two of the three polyelectrolyte layers in each case being labeled with at least one different dye and the two polyelectrolyte layers which are labeled with a different dye being separated from each other by at least the third polyelectrolyte layer which is not labeled with dyes.

7. A composition as claimed in claim 6, characterized in that it comprises at least three types of different capsules.

8. A composition as claimed in claim 6 or 7, characterized in that the third polyelectrolyte layer, which not labeled with dyes, has a thickness of between 0.1 nm and 10 nm.

9. A composition as claimed in one of claims 6 to 8, characterized in that the third polyelectrolyte layer, which is not labeled with dyes, is a sensitive layer which either swells or shrinks, with its thickness thereby being altered, when its environmental conditions change.

10. A composition as claimed in claim 9, characterized in that the environmental conditions are the pH, the salt concentration, the temperature, adsorbed components, enzymes, the concentration of a substance, physical parameters, components which affect the solvent or which react with the sensitive layer, and also miscible solvent constituents.

11. A composition as claimed in one of claims 6 to 10, characterized in that the different dyes are a dye of higher absorption energy (donor) and a dye of lower

absorption energy (acceptor).

12. A composition as claimed in one of claims 6 to 11, characterized in that the different dyes are coordinated with each other such that it is possible for a Förster (fluorescence) resonance energy transfer (FRET) to take place between the different dyes.

13. A composition as claimed in one of claims 6 to 12, characterized in that additional polyelectrolyte layers, which are not labeled with dyes, are located between the polyelectrolyte layers which are labeled with dyes, and alongside the third polyelectrolyte layer which is not labeled with dyes, or else the third polyelectrolyte layer which is not labeled with dyes for its part consists of several polyelectrolyte layers.

14. A composition as claimed in one of claims 6 to 13, characterized in that the sensitive layer is an organic polyelectrolyte layer.

15. A capsule or composition as claimed in one of the preceding claims, characterized in that the dyes are fluorescent dyes or emitting nanoparticles.

16. A capsule or composition as claimed in one of the preceding claims, characterized in that the capsule is hollow and macromolecules are located in its internal space which is delimited by the envelope.

17. A capsule or composition as claimed in one of claims 1 to 15, characterized in that the capsule has a modified core which possesses sensory or coordinating properties.

18. A capsule or composition as claimed in one of the preceding claims, characterized in that the envelope

are permeable to molecules of up to a given size.

19. A capsule or composition as claimed in one of claims 1 to 15, characterized in that the capsule possesses a solid core which is surrounded by the envelope.

20. A capsule or composition as claimed in one of the preceding claims, characterized in that the capsule has an average diameter of less than 10 µm, preferably of less than 1 µm.

21. A capsule or composition as claimed in one of the preceding claims, characterized in that the capsule is prepared by the layer-by-layer method.

22. A capsule or composition as claimed in one of the preceding claims, characterized in that the capsule or the composition is used for labeling or coding industrial products, particles, cells, tissues, organs or organisms of biological origin.

23. The use of a capsule or composition as claimed in one of the preceding claims as a library of reporter particles or coded color particles for identifying substances and/or labeling processes.

24. The use of a capsule or composition as claimed in one of the preceding claims in medical diagnosis, combinatorial chemistry, genomics and proteomics, biology and biotechnology and industry.